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Teaching Critical Thinking in Interdisciplinary Economics Courses

J. Rody Borg and Mary O. Borg

Critical thinking has become an increasingly important topic of conversation on college campuses.¹ What is critical thinking? Can we really teach students to think, if they don't already know how? Many of our colleagues in the economics profession have been skeptical of the need to specifically teach critical thinking skills because they believe that the analytical nature of most economics courses inherently teaches students to think critically.

We would like to recommend another approach—team-teaching an interdisciplinary course with a colleague from another discipline that has a very different set of assumptions and values. We will discuss two honors courses that we have taught with colleagues, Modern Economic and Cultural Revolutions and Economics of Human Ecology.

Before any serious discussion can take place, however, we must define *critical thinking*. Although many definitions exist, the one that we adopt here, which has been used by the majority of economists on this issue (Thoma 1993; Feiner and Roberts 1995; Browne, Hoag, and Boudreau 1995), comes from William Perry's (1970) model of intellectual and ethical development. That well-known model describes a student's cognitive

development in four stages from the lowest level—dualism—to the highest level—the ability to make contextually appropriate decisions.

Similarly to Thoma (1993), we have chosen to use Craig Nelson's (1989) description of the Perry schema for ease of exposition. Nelson describes dualism as characterized by a world view that sees all questions in terms of black and white, right or wrong answers. Students at this level believe that all questions have objective, immutable answers; to discover these answers, they need only refer to an expert (such as a teacher) who will impart the facts to them. A dualist has little tolerance for uncertainty and ambiguity. Yet a confrontation with ambiguity is exactly what students need to enable them to advance to the next level of cognitive development, the multiplicity stage.

In that stage, students perceive that knowledge and truth are essentially subjective; however, they have not yet developed the skills to evaluate critically which view of truth and knowledge is more legitimate than another. In stage two, Rush Limbaugh and Paul Krugman, for example, would have the same credibility in discussing the economic consequences of the North American Free Trade Act.

It is extremely important, then, to teach students the criteria for making judgments in the context of uncertainty. Those criteria may include realism of assumptions, logical consistency, empirical evidence,

explanatory power, and the ability to predict. Teaching students to recognize and apply these criteria to competing theories and explanations of the way the world works is essential for their advancement to stage three, contextual relativism.

In stage three, students begin to realize that each academic discipline has its own critical standards for how to choose among competing views and theories. In economics, for example, students learn that theoretical rigor and the ability to predict are more important criteria for accepting a theory than is the reality of the assumptions that one makes in deriving a theory. On the other hand, in sociology or anthropology, the reality of the assumptions is given more weight than is theoretical rigor. We need to remember that students in this stage may view discipline-specific methods and criteria simply as something to be mastered in order to receive a good grade. They have not yet realized that those different ways of judging competing theories are vitally important outside the classroom.

When students understand that each discipline's particular methods can contribute to decision making in all contexts—academic or not—they have made the transition to the highest stage of cognitive development, making contextually appropriate decisions. Students come to realize that they can make choices on the basis of different discipline-specific methods and criteria in the context of *their own values*. In this stage, therefore,

a student may be able to reject an economist's theory of the minimum wage for the sociologist's because it fits better with her own values. It may actually be unrealistic for us to expect that students will reach this level of development while they are undergraduates. However, a college education that helps students achieve at least the skills of stage three will give them the necessary tools to reach stage four when their values are fully formed.

Economics and Critical Thinking

Based on this definition of critical thinking, it is clear that economics, simply by its inherent nature, does not teach critical thinking. It teaches analytical thinking, to be sure, but our analytical models are based on a set of underlying assumptions, which our students may not be asked to evaluate critically. With the possible exception of Intermediate Macroeconomics, most teachers of traditional undergraduate economic theory courses pay little attention to discussing alternatives to the standard economic assumptions.

Even at the graduate level, there seems to be some confusion within the profession over the perception and the reality of teaching critical thinking. Powers and Enright (1987) developed a survey to measure the importance of a variety of evaluative skills for graduate students in six disciplines: English, education, engineering, chemistry, computer science, and psychology.

Browne, Hoag, and Boudreau (1995) sent that same survey to fifty-eight higher education institutions with doctoral programs in economics. Based on the results of the thirty-five usable surveys that were returned, they concluded that the graduate faculty highly value critical thinking skills and believe that they are being incorporated into the graduate curriculum at their institutions. Examples of some of the valuable skills were (a) reasoning or problem solving in situations in which all information is not known, (b) recognizing structural similarities between one type of problem or theory and another, and (c) deriving structural features or functional principles that can be applied to other cases from the study of single cases (Browne, Hoag, and Boudreau 1995, 180).

Disillusioned Graduate Students

In contrast to those faculty members, however, the graduate students interviewed by Klamer and Colander (1990) at six high-ranking doctoral programs in economics are extremely disillusioned with their training in critical thinking skills. The authors report that although the students are well trained in technical problem solving, they want to learn more about economic policy issues, the interdisciplinary relevance of economics, the validity of fundamental assumptions, and alternative approaches.

Browne, Hoag, and Boudreau (1995) come to the following conclusion:

. . . although certain mathematical and problem-solving skills are of great value in graduate economics programs, critical thinking skills, such as questioning assumptions, recognizing historical context, and generating new questions or alternative conclusions, are often ignored. If this situation is indeed the case, then graduate economics students are not developing, unless by osmosis, certain indispensable abilities highly prized by professors in the field. (180)

If economics graduate students are not themselves developing these skills, how are they going to teach them to their future undergraduates?

It seems, then, that economists must work intentionally to put critical thinking skills into their courses—as, of course, all college professors must. We can add assignments that promote thinking skills and alter our traditional teaching strategies. In fact, many economic educators have written about their experiences in promoting critical thinking in standard economics courses (Feiner and Roberts 1995; Shackleford 1995). We suggest one more approach—team teaching a course that combines economics and another discipline with contrasting assumptions and values.

Teaching Critical Thinking in Interdisciplinary Courses

By their very nature, interdisciplinary courses require that students reach the third level of Perry's critical thinking schema in which they realize that disciplines have different criteria for evaluating competing theories. We believe that in the best interdisciplinary courses the

students will also be able to reach level four: to be able to discern the values inherent in the various ways of evaluating theories and to make appropriate decisions in context.

Moreover, when we use team teaching, the students see two "experts" in the classroom who often disagree with one another and see issues in contrasting lights. The students, then, are less likely to mimic the professor's thoughts as their own in the hopes of getting a good grade because no matter which professor they mimic, the other disagrees with them! That promotes more independent thinking and diminishes the degree to which the classroom is centered on the teacher.

We will cite examples from two interdisciplinary honors courses that we have taught with colleagues. The first is Modern Economic and Cultural Revolutions, which was taught by Professor Mary Borg in partnership with Professor Marnie Jones of the Department of English and Foreign Languages at the University of North Florida. The second course is Economics of Human Ecology taught at Jacksonville University by Professor Rody Borg and Professor Ken Hoover of the biology department.

Economics and English Literature

Modern Economic and Cultural Revolutions is a six-hour honors seminar that explores important trends during the seventeenth through the twentieth centuries by examining economic theory and literary works concurrently. It hones students' critical thinking skills in a number of ways. The course shows how both literature and economic theories reflect their own underlying world view of and assumptions about a historical era. We examine, for example, both Adam Smith's *The Wealth of Nations*, written in 1776, and Daniel Defoe's *Moll Flanders*, written in 1722, against the background of the historical and philosophical trends of the late seventeenth and eighteenth centuries.

These works are similar in revealing the shift from a world view that emphasizes the nation-state to one that emphasizes the individual. In fact, Adam Smith's laissez-faire economic policies that encourage individuals to act in their own self-interest are not much different from Moll Flanders's actions on her own

behalf. Given the severe limitations imposed on women in that time, Moll's most marketable asset is sex, and she uses it to her advantage. She marries five times over the course of her life, always to improve her financial and social status—even though it means that she must abandon her children.

Individualism

Although both the economic and the literary works reflect individualism, the two works portray clashing beliefs about its effects. According to Adam Smith, the effects of market individualism are good for society. In fact, he says very clearly that acting selfishly leads society as if by an “invisible hand” to its best possible outcome.

Daniel Defoe, on the other hand, is more ambivalent about the effects of Moll's strong individualism. She is portrayed throughout the novel as cold, calculating, and greedy—a woman who will abandon her children to improve her economic situation. Things turn out all right for her in the end only after she does penance for her sins in the form of a prison sentence and transportation to the colonies. Defoe's view of the world is that unbridled individualism leads to suffering for both Moll and her family; thus, individualism must be tempered by conscience.

Students also deepen their understanding by learning to observe that the theories of Adam Smith and other economists deal in the general, while literary works deal in particulars. In *The Wealth of Nations*, individuals are seldom mentioned. Adam Smith is more concerned with the welfare of society than with any particular person in it. Daniel Defoe, on the other hand, is concerned with the welfare of a woman such as Moll Flanders.

By the nineteenth century, the gap widens between the two disciplines because economic theory becomes more abstract and novels more personal. A comparison of the way in which the Industrial Revolution is presented by classical economists such as David Ricardo and Karl Marx versus the way it is presented by Victorian novelists such as Charles Dickens and Elizabeth Gaskell illustrates the gap. Economists writing during the period focused on the phenom-

enal increases in productivity that the Industrial Revolution brought for society as a whole. But novelists who chronicled the everyday lives of ordinary people could not ignore the grim living conditions of the new class of urban workers, Marx's “proletariat,” created by the Industrial Revolution.

Even though Marx was sympathetic to the cause of labor, he presents laborers only in the abstract. We do not see the human faces behind his “proletariat” or his “reserve army of the unemployed.” In that, he is like Ricardo and every other economist of his day because his focus is on what is best for society in general rather than for the individual.

We need the Victorian novelists to understand the people of the working class. Dickens is by far the best known, and we can all see in our mind's eye Oliver Twist asking for more gruel in the workhouse. But an overlooked novel, Elizabeth Gaskell's *North and South*, deals more specifically with the class conflicts of landlords, capitalists, and labor. The title refers to the conflict between the landlords who live in the agrarian south of England and the capitalists in the industrial north.

The novel begins with the protagonist, Margaret Hale, living in the south with her father, an Anglican minister. After her father questions the doctrines of the church, he leaves the ministry to become the tutor of John Thornton, a wealthy industrialist in the north. Gaskell puts human faces on both the landed class in the south and the industrialists in the north. She sees good and bad attributes in both cultures.

Just as Gaskell sees right and wrong in both the landlords and the capitalists, she also sees worthy and unworthy qualities in the laborers, “the hands,” as she calls them. She presents the working class with much sympathy in the character of Bessy Higgins, a young girl who works in Mr. Thornton's textile factory and eventually dies of what we now know is brown lung disease. However, Bessy's father, Nicholas, is portrayed as selfish, hot-headed, and prone to drink. Surprisingly, Gaskell opposes the idea of workers' unions and strikes because she believes that, too often, unions advocate violence, and strikes always lead to more misery

for the hands because they are left without income.

Gaskell's solution is for all classes to communicate with one another and work together to reform the system without overthrowing it. Her overriding theme in the novel is the mutual dependence of the classes.

Interdependence versus Class Conflict

Gaskell's humanistic view of interdependence contrasts strikingly with that of the economists who were emphasizing the competing interests of the classes. Ricardo believed that the most important conflict of the time was between landlords and capitalists and that the capitalists needed to “win” for the economy to continue to grow. He opposed the Corn Laws because they kept the price of grain high, which gave more wealth to the landowners. Instead, more wealth needed to flow to the capitalists who would use it to increase the capital stock of the nation. Landlords, on the other hand, would use their wealth for luxurious living.

Marx emphasized the class conflict between the capitalists and laborers. He believed that labor was the source of all value, yet was paid only a fraction of what the workers produced. Eventually, he theorized, they would grow angry at being exploited and would overthrow their oppressors. Once again, the economist is advocating a decisive victory of one class over another as the ultimate outcome of class conflict.

Elizabeth Gaskell recognized the conflict among the classes of her day as surely as Ricardo and Marx did. Her husband was a prominent minister in the Unitarian Universalist Church in Manchester, the hot seat of the Industrial Revolution in mid-nineteenth-century England. Nevertheless, she believed that the ultimate solution must be cooperation and shared wealth among the classes—quite a different outcome than that of either Ricardo or Marx. The important values of her faith, especially a recognition and respect for the interdependent web of all living things, are evident throughout *North and South*.

Once students recognize how Mrs. Gaskell's values affected her view of the world, they begin to realize that Marx's and Ricardo's values affected their eco-

conomic theories as surely as did Gaskell's. This is an important step in the transition to stage four of the critical thinking schema.

Economics and Biology

The Economics of Human Ecology is an interdisciplinary honors course combining biology and economics. It examines the position of humans on the planet and their roles in the ecosystem. The impact of this course on students' critical thinking development comes in several ways. First, it emphasizes that the two disciplines have different—often clashing—assumptions. Further, students find that the two disciplines analyze certain issues in contrasting ways. The course also causes students to re-examine their own perceptions and to realize that various means may be used to achieve the same end. Finally, the course emphasizes the importance of values as the determining factor in what that end will be.

World Population/Economic Growth

A major portion of the course concerns the issue of world population growth and its implication for economic growth, both on a worldwide scale as well as in less-developed countries (LDCs). In general, the position taken by biologists is that humans represent a net drain on natural resources and that "excessive" population growth moves humankind toward an ultimate disaster. That will occur when total population meets or exceeds the planet's carrying capacity. At that point, it will be impossible to provide for our basic needs.

This view, taken from the observations of such occurrences in nature, leads to the conclusion that the primary problem in LDCs is excessive population growth. The restriction of population growth in such countries will result in increased output per person and the potential for a balance between the needs of humans and the limited resources available for their satisfaction.

This widely accepted proposition was first stated by Malthus in his 1798 work, *The Principles of Population*. More recent discussions of the principle and its implications can be found in both mainstream biological literature (Andrewartha and Birch 1954; Revelle 1992; U.N. Population Fund 1990) and in writings that

are somewhat more popular and more controversial (Ehrlich 1968, 1989, 1990).

In contrast are the views of economists such as Julian Simon who argue that population growth represents an expansion of labor, the major resource of many of the LDCs. Increases in labor provide the opportunity to increase output, resulting, eventually, in an improvement in the standard of living. Thus, any effort to restrict population growth may limit potential growth in output, resulting in LDCs remaining underdeveloped forever.

Further, there is the "unborn genius" argument, which states that the next child born in any given LDC may be the next great genius of the world. If restrictions on population growth result in that person's not being born, the world, as well as the LDC, will suffer a tremendous loss.

Furthermore, economists argue that the historical record demonstrates that technological change has been the usual response to the pressures created when carrying capacity is approached. Given the consistency of such responses, it is reasonable to expect that similar situations occurring in the future will result in additional technological change. Because a growth in population has several potential benefits, limiting that growth in order to improve living standards is not a clear-cut conclusion.

Julian Simon, the leading proponent of these economic views, has written extensively in both academic and popular works. His book *The Ultimate Resource* (1981) is an excellent starting point; see the bibliography for others. One should also consider Schultz (1984) and Zimmerman (1951). Certainly not all economists agree (see Swaney 1991). The interview of Simon reported by Miele (1997) provides interesting insights into his position in the debate. The discussion of the now famous bet between Simon and Ehrlich is particularly revealing of the differences in thinking and approach between the disciplines that the interdisciplinary course brings out.

On the other hand, biologists maintain that, although the historical record regarding technological change is accurate, it cannot be relied on as a predictor of future responses. Given that the consequences of excessive pressure on carrying capacity are potentially disastrous, such a

chance should not be taken. Population growth must be curbed.

The problem of population growth and the resulting pressure on world resources is different in the global context than in the LDC context. Most students view the problem of unrestrained population growth as a Third World problem. Given that the vast majority of the world's resources are used by the minority of the world's population living in the developed nations of the "West," arguments that we should restrict population growth in less-developed countries are even more dubious. Because the citizens of LDCs use proportionately fewer resources than those of the developed countries, population growth in such countries is not an obvious threat to carrying capacity.

Even mild population growth in developed nations, however, represents a much greater increase in pressure on the world's resources. Given such information, students must confront potentially troubling issues such as whether the developed world has the right to tell LDCs what their population growth rates should be, and whether our population policy toward the LDCs might be racist because most of the developing world is nonwhite (Sitarz 1993; Revelle 1992).

Humans versus Animals

A second major topic that contributes to improving students' critical reasoning is the issue of humans versus animals. As population growth continues, the needs of humans invariably come into conflict with those of animals on the appropriate use of resources. Biologists argue that every animal is invaluable, and biodiversity is generally desirable because it stabilizes ecosystems (Kriebs 1994; Pimon 1984).

Conversely, economists maintain that animals have some definable, though unknown, economic value. This vital issue has important consequences for a number of other timely issues such as deforestation, logging, habitat preservation, and limiting growth and development.

The biologist's view that we cannot place an economic value on animals comes from the uncertainty surrounding the full value of every animal to the ecosystem (Sitarz 1993; Norton 1986; Taylor 1989). Thus, we must maintain sufficient habitat to guarantee the survival

of all animals because of the possible impact that each animal might have on the ecosystem.

Conflicting Values

By contrast, economists apply marginal cost/marginal benefit analysis to derive an implicit, if not explicit, value for animals and their habitats. To maximize society's welfare, economists argue, the resources devoted to animals should be placed in their highest valued use. If individuals in a society believe that such resources are "invaluable," or at least of greater value as habitat than in other uses, they should raise money to purchase the resources and hold them in reserve.

The discussion of such "gray," though important, issues allows students to recognize the different values that are behind the theories of economists, biologists, and other groups. It is not as simple as saying that economists take the side of business and biologists side with environmentalists. Both disciplines are trying to maximize the welfare of society under conditions of uncertainty; however, economists give more credence to the short-run consequences of resource use while biologists are more concerned with the long run.

In addition, students become aware that expecting private citizens to pay for habitat preservation is subject to the free rider principle, and, therefore, will likely result in too few resources being preserved for future generations. The solution for that market failure is that government must restrict or regulate the use of such resources to ensure their preservation in something closer to optimal amounts. That is essentially the same conclusion that would be reached by biologists, but from a very different starting point and via other thought processes. As a consequence, students recognize that disciplinary differences in initial assumptions and analytical approaches do not necessarily lead to different policy conclusions.

The subject matter of the Economics of Human Ecology course was not the only device used for teaching critical thinking. We also used a pedagogical approach that enhanced critical thinking skills. The students participated in several debates, a vital part of the course. They were always unannounced and covered various issues.

We established teams and assigned them specific positions. The teams had no input as to which side they preferred to argue. To strongly encourage students to examine rationally the different sides of an issue, we often stopped the debate at a middle point and then required the two teams to switch sides.

Not surprisingly, the students had great difficulty with this exercise at first. To ease the situation, the instructors participated in the debates initially. By the end of the course, however, the students were quite able to re-examine issues and construct counterarguments for the various positions.

The debates not only allowed the students to see the differences in one discipline's approach from the other, they also helped them learn to examine the approaches in the light of their own values. The long-term benefit of that ability is ultimately of much greater value, of course, than proving in the classroom that one approach is superior to the other.

Assessing the Benefits of Interdisciplinary Teaching

Although we used no formal assessment instruments to determine if students actually did increase their ability to think critically, we believe that the two courses had a positive effect on our students' critical thinking skills. One of the first indications was the high quality of our classroom discussions. Students showed no reticence to discuss even the most controversial issues, and they were less likely to make unsubstantiated claims in presenting their points.

In other words, students were more likely to find supporting evidence. That may have come from their observing how two academics sparred with each other in class, or from often being asked to argue a side of an issue with which they personally disagreed. Whatever the reason, students began to realize that mere opinion and values, no matter how strongly held, must be supported by evidence.

Moreover, we noticed that many students had learned to consider a wider range of opinions than before. When faced with evidence that challenged their traditional beliefs, students were not afraid to change their minds. Personally, we found this rewarding, because we

believe that is the primary goal of education and the essence of thinking critically. We believe that students were more likely to consider an alternative belief system in these team-taught classes because there was not one "right" way to think. Students had learned to evaluate carefully two sides of an issue and decide which viewpoint best fit with their own values.

The final, perhaps most significant, benefit of interdisciplinary courses is simply that students and faculty both seem to like them. The written comments from students on the course evaluations were consistently positive, indicating that the courses were "interesting," "fun," and "made me think." Furthermore, we both felt invigorated after teaching these courses. In addition to learning about a new academic discipline, we saw economics in a fresh light, from the perspective of a noneconomist. As a result, we both believe that our own critical thinking skills were enhanced.

More formal assessment of the benefits of interdisciplinary teaching will have to wait until the next time we teach. When we taught these courses, we did not intend to write about them. But they were so successful from the perspectives of both the faculty and the students involved that we wanted to share our experiences with other college teachers.

In the future, we intend to test the students' critical thinking skills at both the beginning and the end of the class. We will also give the tests to students in standard economics, literature, and biology classes as our control group. Performance tests of that type should provide more objective measurements of the benefits of interdisciplinary teaching. However, in our own subjective views, we are already convinced that the benefits of this type of teaching are, indeed, tangible.

Conclusion

Students sharpen their critical thinking skills by trying to discern the values that form the basis of disciplinary differences. Simply teaching our students to "think like economists" does not teach them to think critically. Students must be able to discern the assumptions and values behind the economists' ideas. We believe that those values are better understood when they are juxtaposed against the val-

ues of another discipline. Economists, for example, hold the values of the Utilitarians who believed that the welfare (or utility) of the whole is more important than the utility (or in some cases, the disutility) of an individual.

Most novelists and biologists, however, take the opposite view. They give the individual factory worker, or even the snail darter, more weight in their decisions than economists do. Neither group is entirely right or wrong. They are simply letting their values inform their choice of, or belief in, a theory. Recognizing that fact is an important step in the evolution of critical thinking skills.

NOTE

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BIBLIOGRAPHY

- Andrewartha, H. G., and L. C. Birch. 1954. *The distribution and abundance of animals*. Chicago, Ill.: University of Chicago Press.
- Ayres, C. E. 1962. *The theory of economic progress*. New York: Schocken.
- Browne, M. N., J. H. Hoag, and N. Boudreau. 1995. Critical thinking in graduate economic programs: A study of faculty perceptions. *Journal of Economic Education* 26(Spring): 177–81.
- Ehrlich, P. R. 1968. *The population bomb*. New York: Ballantine.
- . 1990. *The population explosion*. New York: Simon & Schuster.
- Ehrlich, P. R., and A. H. Ehrlich. 1989. Speaking out on overpopulation. *Issues in Science and Technology* 5(Winter 1988–89): 36–7.
- Feiner, S., and B. Roberts. 1995. Using alternative paradigms to teach about race and gender: A critical thinking approach to introductory economics. *American Economic Association Papers and Proceedings* 85(May): 367–71.
- Gaskell, E. 1986. *North and south*. London: Penguin Books.
- Klamer, A., and D. Colander. 1990. *The making of an economist*. San Francisco: Westview.
- Kriebs, C. J. 1994. *Ecology*. 4th ed. New York: Harper-Collins College Publishers.
- Malthus, T. R. 1926. *First essay on population*. London: Macmillan.
- Miele, F. 1996. Living within limits and limits on living: Garrett Hardin on ecology, economy, and ethics. *Skeptic* 4(2): 42–6.
- . 1997. Living without limits: An interview with Julian Simon. *Skeptic* 5(1): 54–9.
- Nelson, C. 1989. Skewered on the unicorn's horn: The illusion of tragic tradeoff between content and critical thinking in the teaching of science. In *Enhancing critical thinking in the sciences*, ed. L. Crow. Washington, D.C.: Society of College Science Teachers.
- Nelson, J. A. 1992. Gender, metaphor, and the definition of economics. *Economics and Philosophy* 8(1): 103–25.
- Norton, B. G., ed. 1986. *The preservation of species: The value of biological diversity*. Princeton, N.J.: Princeton University Press.
- Perry, W. 1970. *Forms of intellectual and ethical development in the college years: A scheme*. New York: Holt, Rinehart, & Winston.
- Pianka, E. R. 2000. *Evolutionary ecology*. San Francisco: Addison Educational Publishers.
- Pimon, S. L. 1984. The complexity and stability of ecosystems. *Nature* 307: 321–6.
- Powers, D. E., and M. K. Enright. 1987. Analytical reasoning skills in graduate study: Perceptions of faculty in six fields. *Journal of Higher Education* (Nov./Dec.): 658–82.
- Revelle, P., and C. Revelle. 1992. *The global environment: Securing a sustainable future*. Boston, Mass.: Jones & Bartlett.
- Schultz, T. 1984. *Investing in people*. Chicago, Ill.: University of Chicago Press.
- Shackelford, J. 1992. Feminist pedagogy: A means for bringing critical thinking and creativity to the economics classroom. *American Economic Association Papers and Proceedings* 82(May): 570–6.
- Simon, J. L. 1990. Population panic. *Fortune* 21 May, 160–1.
- . 1981. *The ultimate resource*. Princeton, N.J.: Princeton University.
- . 1990. *Population matters: People, resources, environment, immigration*. New Brunswick, N.J.: Transaction Press.
- . 1995a. Earth's doomsayers are wrong. *San Francisco Chronicle*, 18 May.
- . 1995b. *The state of humanity*. Boston, Mass.: Basil Blackwell.
- . 1996. *The ultimate resource 2*. Princeton, N.J.: Princeton University.
- Sitarz, D., ed. 1993. *Agenda 21: The earth summit strategy to save our planet*. Boulder, Col.: Earth Press.
- Swaney, J. A. 1991. Julian Simon versus the Ehrlichs: An institutionalist perspective. *Journal of Economic Issues* 25(June): 499–509.
- Taylor, P. W. 1989. *Respect for nature: A theory of environmental ethics*. Princeton, N.J.: Princeton University Press.
- Thoma, G. A. 1993. The Perry framework and tactics for teaching critical thinking in economics. *Journal of Economic Education* 24 (Spring): 128–36.
- United Nations. 1990. *The state of the world population report 1990*. New York: United Nations Population Fund.
- Zimmerman, E. W. 1951. *World resources and industries*. New York: Harper and Brothers.